THE MOTOR AGE

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LEADING CONTENTS

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MEES ENGINE AND SPEED CHANGING GEAR

In the course of an interesting description of the various parts of the mechanism of the carriages of Gustav Mees, who was the recipient of a gold medal at the recent Berlin exhibition, the Automotor Journal characterizes the transmission and speed change gearing as the most notable feature of the carriage, although it is fitted with a motor which is very different from those in ordinary use, being a single cylinder engine with two opposed pistons, working on the same crank shaft by means of lever arms.

Fig. 1 shows a prospective view of a complete engine of the larger size which is water cooled. Engines of two to three horsepower are made, however, which are cooled by means of radiation fins. Fig. 2 shows a sectional elevation of the motor, from which a clear idea of the principle on which it works can be gleaned. There is, of course, but one explosion chamber, one admission valve and one exhaust valve. An oil bath is provided within the crank chamber.

In its description the Automotor continues as follows:

In the Mees gear a very good arrange-

ment is found whereby the power is transmitted and varied within limits with a really very small loss of efficiency. The principle utilized is that of the epicyclic or "sun and planet" transmission.

Before proceeding further it may be as well to explain the principle of the so-called "sun and planet" wheels, which perhaps may not be known to all our readers. In gearings of this kind, which in themselves are already known and frequently employed, two or more cog wheels, P, P (see Fig. 3), are in constant-

wheel pins, b. b. are fixed—there takes place a transmission of power, and the movement is converted into a quicker or slower one, according to whether the tooth ring, Z, or the wheel, J, is the driving wheel. In consequence of the constant engagement of the wheels, such gearings allow of a change to another speed or to another degree of transmission without shock and without previous disconnection of the motor whether running loose or in work.

This method is in marked contrast to

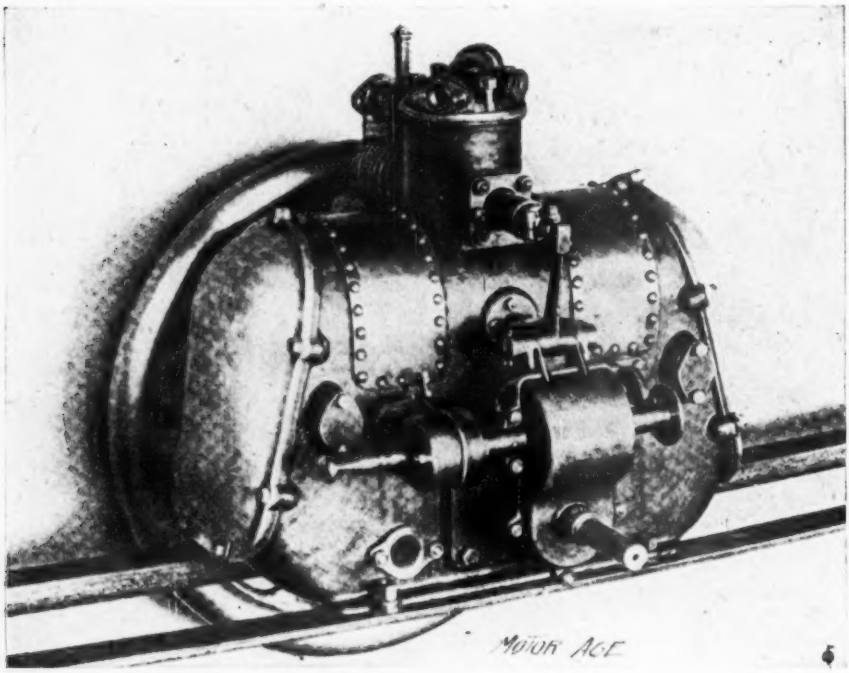


FIGURE 1.

engagement on the one hand with a cog wheel, J, mounted on the gear shaft, W, and on the other hand with a toothed ring having teeth on its internal periphery, and these wheels travel round the ring planet-wise when the machine is running without working (it being immaterial whether they are carried along with the toothed ring, Z, or the wheel, J), and hence their name, "planet wheels." But if the planet wheels are prevented from rotating freely—and this can be effected by means of suitable brake mechanisms applied to the discs on which the planet-

the very frequently used displaceable wheels in motor-car construction, in which, for the purpose of altering the speed, another pair of toothed wheels must be brought into engagement by a displacing or adjusting device, which, of course, in the absence of an elastic link, is impossible without first throwing the motor out of action, and is always effected with a more or less violent shock, owing to which the edges of the teeth which first come into engagement are worn in a very short time.

Fig. 4 is a sectional elevation of the

transmission and change speed, and differential gear. Fig. 5 is a perspective view of the sun and planet motion on the line, C, D (Fig. 4). Fig. 6 is a side elevation of Fig. 5.

Referring to Fig. 4, it will be seen that

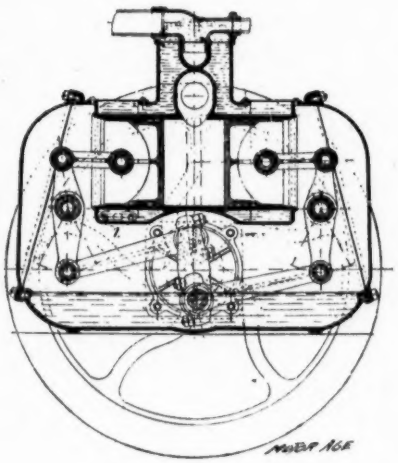


Figure 2.

there is an intermediate hollow shaft, W, surrounding the solid wheel shaft w and connecting with the differential gear D. On this shaft, W, are three separate sets of gearing, which are operated from the motor shaft, M, by means of bevel gear, K, K', K2, and the driving of two of the gearings takes place by means of the wheel, K', traveling to the right (forward travel), and that of the third gearing from the wheel, K2, rotating to the left (backward travel).

In order to obtain an engagement of the separate gearings free from shock, they are arranged on the planet-wheel system; that is to say, a suitable number of so-called "planet-wheels," P', P2, P3 (see also Figs. 5 and 6), in the present instance three, are in constant engagement, both with a central internal wheel, J', J2, J3, and with an outer ring or wheel, Z', Z2, Z3, having internal teeth. When one gearing is running without driving the vehicle, the planet wheels, P' (P2, P3), are carried planet-wise around the inner wheel, J (J2, J3), by the ring of internal teeth, Z' (Z2, Z3), and carry with them a brake wheel, S' (S2, S3), on which they are mounted by means of studs b' (b2, b3). If, however, the circling of the planet wheels be stopped by rendering the brake wheel, S' (S2, S3), and the studs, b' (b2, b3), stationary by putting on the brake, B' (B2, B3), (Figs. 4 and 8), the power will be transferred through the then stationary but revoluble planet wheels from the toothed ring, Z' (Z2, Z3), to the internal wheel, J' (J2, J3), or vice versa, according as one or other of the two wheels, Z' or J', is the driving wheel. If the toothed ring, Z' (Z2, Z3) is the driving wheel, the transmission will take place from the larger diameter of the wheel to the smaller diameter of the internal wheel, J' (J2, J3), that is to say, an increase of speed will be attained for rapid traveling, while, conversely, the movement will be retarded or rendered slower if the smaller internal wheel be the driving one, that is to say, the transfer will then take place from the interior to the outside, for instance, for climbing hills.

By this combination, the gearings, Z', P', J', and Z2, P2, J2, are operated by the bevel wheel, K', running to the right, and the gearing, Z3, P3, J3, is operated by the bevel wheel, K2, running to the left. If, for instance, one of the two first-

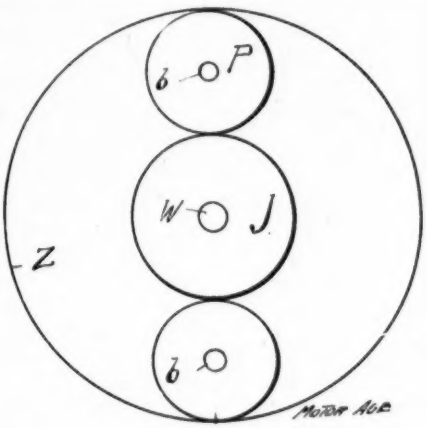


Figure 3.

named gearings be thrown into action, the carriage will travel forward slowly or rapidly, according to the gearing engaged. On the other hand, the carriage will travel backward when the gearings, Z3, J3, P3, are thrown into gear. If the brake, B', be applied for rapid traveling or high gear, the power is conveyed from the

bevel wheel, K', by means of the toothed ring Z, planet wheels, P', and internal wheel, J, directly to the intermediate shaft, W.

If, again, the gearing be thrown into

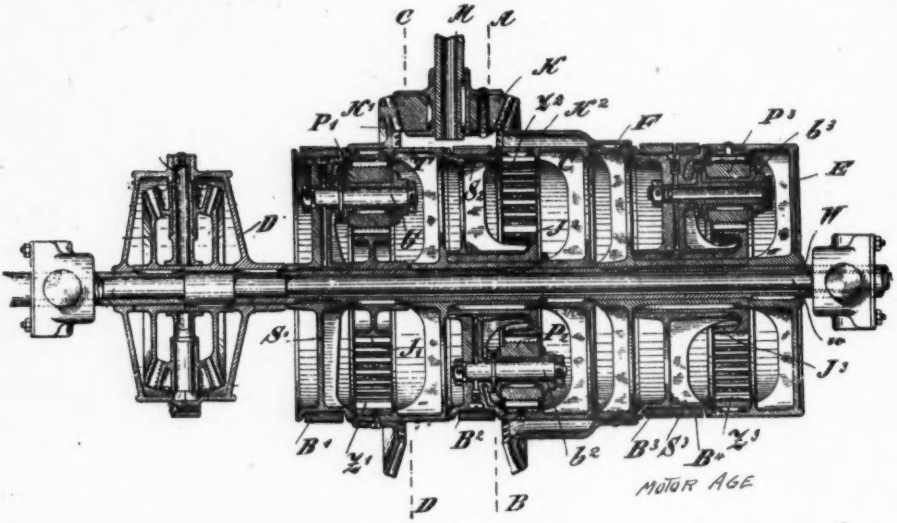


FIGURE 4.

action for hill climbing (low gear), the transmission of power will take place from the wheel, K', through the arms and the hub of a wheel, T, on which K' is mounted, to the internal wheel, J2, keyed on it, and thus to the planet wheels, P2, which then drive the toothed ring, Z2, which is mounted on a wheel, C, keyed on the intermediate shaft, which thus receives the power. Similarly on the gear being thrown into action for the rearward

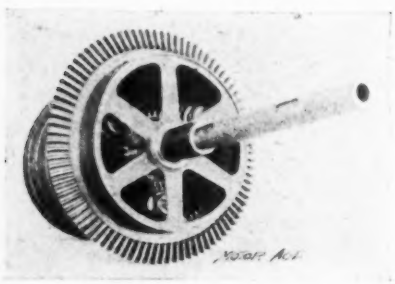


Figure 5.

movement the power passes from the bevel wheel, K2, through a wheel, F, on which same is mounted, to the internal wheel, J3, keyed on the hub of this wheel, F, and thence to the planet wheels, P3, and toothed ring, Z3, mounted on a wheel, E, keyed on the shaft, which thus receives the power.

The brakes (Fig. 7) necessary for throwing the gear into action are operated by two hand levers arranged at the side of the carriage frame, which are

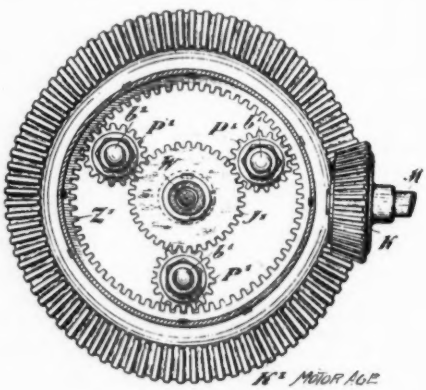


Figure 6.

keyed on two shafts mounted concentrically one within the other in eyes or bearings. The front lever mounted one of the lever shafts, controls the brakes, B' and B2, for the two forward gearings by means of levers, keyed firmly on this shaft, while the reversing lever, lying behind it controls the two brakes, B3 and B4, arranged on a

single brake wheel, S3, by means of a hollow shaft and two levers. If both levers stand in a middle position, none of the four brakes are applied, and all three gearings consequently run without driving the vehicle. If the lever for the forward gearings be moved to the right, the brake, B', is put on and the gearing for rapid travel is set in action. If, on the other hand, this lever be put over in the reverse direction (to the left), the gear for slow traveling is thrown into action by the operation of the brake, B2. The reversing or backward travel gearing, however, is engaged by the reversing lever being moved to the right or to the left, in the first case by means of the lever and brake, B3, and in the second case by means of the lever and brake, B4. It is evident that only one gearing can be in action, so that thus when one of the two levers is placed to the right or left the other must stand in the middle position.

The gearing for backward travel may also be used as an instantaneous brake—that is to say, for immediately stopping the vehicle, as by the application of the reversing lever, after of course previously disconnecting the forward gear, the kinetic energy of the carriage must first be overcome before the backward travel gear can come into action. Putting on the brakes for the backward-travel gear therefore acts precisely as if a steam-

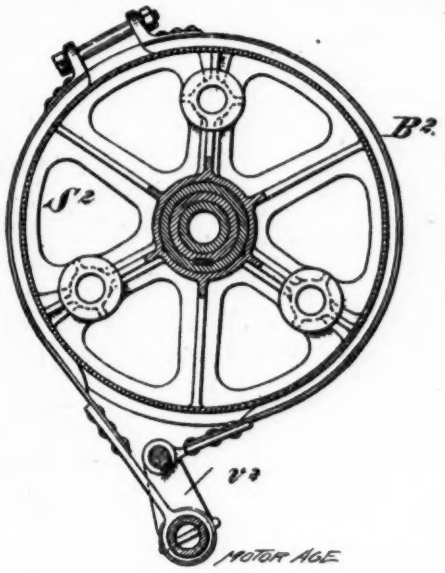


Figure 7.

driven vehicle were brought to a standstill by reversing the steam.

Provision is made for preventing the reverse gear being thrown in before the momentum of the carriage is stopped.

MOTOR RACING AND MOTOR PACING

CHALLENGE MADE AND ACCEPTED

Boston, March 25.—It looks as though Massachusetts would have the first long-distance motor tricycle race in this country. Some weeks ago, Albert Champion, Dudley Mark's protege, who has come to this country from France, issued a challenge in which he threatened to do things to any motorman that was willing.

The only possible expert in this district who could make a race with him at that time was in Europe—Kenneth A. Skinner of the de Dion forces. Mr. Skinner returned to Boston the other day and decided that Champion could be beaten on a tricycle. Mr. Skinner is a practical man and believes that money is audible. So he posted $50 and is waiting for Champion to cover it.

Mr. Skinner insists on a race of from fifty to 100 miles, for side bets of from $150 to $500. It is probable that the race will be brought off on a triangular course near Boston, but the location will be kept secret from all but a favored few, for we of conservative Boston have to go carefully. The policy of Boston motor drivers is to wound nobody's feelings, but

to keep developing the sport until the public accepts it as a matter of course.

Mr. Skinner proposes to fit one of his present Orient road tricycles with a more powerful motor. It will be the French game of De Dion vs. Aster transplanted to the virgin soil of America. For Champion has tied up with the Aster people, according to the best obtainable information, and is a frequent sight on the road between Boston and Waltham, speeding a French tricycle with an Aster motor.

VOITURETTE CUP RACE

The "Journal des Sports" of Paris organized a voiturette race which took place on the 11th of March over the St.-Germain-Rouen course and return, about 137 miles. Out of fifty-four entries thirty-five started, divided into four classes—first, voiturettes not over 550 pounds in weight and with water-cooled motors; second, voiturettes not over 550 pounds, air cooled; third, voiturettes of 550 to 1,100 pounds, water cooled; fourth, voiturettes of 550 to 1,100 pounds, air cooled.

It was a novel race and especially organized to test the two methods of cooling motors. As was expected, the voiturettes with water-cooled motors and especially those of the heavier class, were the winners. Seven out of the first eight belonged to this class. The winner, Thery, of the third class, covered the distance in 4:51:04, or 55 minutes ahead of Tart, of the second class.

BIG MEET IN TURIN

Turin, Italy, will be the center of an important motor vehicle and motocycle carnival next month. The programme is as follows:

April 21.—Hill climbing contest, divided into five classes; first, motocycles with one seat; second, motocycles with two seats; third, voiturettes weighing less than 880 pounds; fourth, double-seated vehicles of over 880 pounds; fifth, vehicles with more than three seats and over 880 pounds. Prizes: Gold, silver and bronze medals.

April 23.—Road race, Turin to Pignerol, Cuneo, Racconigi and return to Turin, a distance of 125 miles. International race, divided into five classes, the same as the foregoing race. Prizes in each race: First, $20 and $10 and medals; second, $40, $20 and medals; third, $60, $30 and medals; fourth, $80, $40 and medals; fifth, $100, $50 and medals.

April 21 to 24.—International exhibition of motor-vehicles, motocycle and photographs referring to the automobile. Prizes, medals.

In the road race the first Italian made vehicle will receive a challenge cup, from the paper, Automobile de Turin.

PARIS-BERLIN RACE

Prince de Talleyrand-Perigord, president of the German Automobile Club, during a recent visit to Paris, had frequent meetings with the leaders of the French Automobile Club, with the object of making arrangements for a motor-vehicle and motocycle road race between the two capitals. It is said that the race will take place some time in August. Great political importance is attached to the event, provided it takes place.

ANNUAL BELGIAN MEET

The sports committee of the Belgian Automobile Club has published the programme of the annual meeting, to be held at Spa. There will be races for three classes of motor-vehicles, as follows:

Vehicles less than 880 pounds in weight over a course of a little more than sixty-five miles.

Vehicles more than 880 pounds in weight and of less than ten horse-power over a course of 115 miles.

Vehicles exceeding 880 pounds weight and ten horse-power over a course of 115 miles.

The prizes in the first class are $80, $60, $40, and $20; in the second, $140, $100, $80, and $60, and in the third class the prizes will be $200, $140, $100, $80, $40, and $20. Medals will be given to first, second and third in each class and special prizes for vehicles in the third class carrying four persons—tourist vehicles, they are called. To compete in the races the chauffeurs must be members of the Belgian club or members of associated clubs in Belgium or recognized foreign clubs.

The races will be preceded by a tour from Brussels to Spa on September 1, the racing taking place on the second and third of the month.

James White of Baltimore has designed a motor tandem which is said to be a wonder. He will use it in pacing Smith, the Baltimore strong man, in the motor races through the Coliceum circuit.

Chairman Batchelder is laboring upon the rules of the season for motocycle and automobile track contests. He has a number of bright minds at work but does not believe it will be possible to cover quite all contingencies in the first rules. Changes will be made as exigencies arise.

Charlie Miller has at last finished his automobile, on which he has been laboring all winter long at an expenditure of time and money. Miller is as pleased with his new four seater as the boy with a new toy, although the expenses have been more than the cost of a new machine.

Harry Elkes and Arthur Ross, the American middle-distance motor pace followers, now at Paris, France, under their contracts to ride French bicycles, are prohibited from following any pace but the French made and French ridden; motors to be supplied them by the companies, with which they have contracted.

John Lawson, the first week in April, at the Los Angeles, Cal., track, paced by four motocycles will endeavor to beat not only Charley Miller's six-day record of 2,170 miles, but also Miller and Waller's team record of 2,741 miles, made at Madison Square Garden last winter. The plucky, long-distance Swede is confident of covering 3,000 miles.

On the shell road at New Orleans on March 21, C. Stewart Bolting, of Providence, R. I., is reported to have ridden a mile straightaway paced by a motocycle in 1:12 2-5. This beats Joe Downey's road record of 1:16 2-5, made tandem paced by Callahan and Caldwell, and Major Taylor's track record of 1:19 made at Chicago.

Another promoter has arranged his program for the season to include a regular weekly motor cycle race of some character. Manager Jay Eaton, of Vailsburg, believes that that is the demand of the public and will place on his program motocycle scratch races with four to six teams, motor cycle paced races, four to six starters, and grand motor paced sweepstakes, handicap events. This last is a thing new this season but likely to prove most interesting. Eaton believes that every racing man will be interested in the motocycle business before the close of the season.

The Waltham Mfg. Co. is in receipt almost daily now of the old 1 3-4 horsepower motors which are being sent in for exchange for 2 1-4 horsepower, to be used generally throughout the season. Hausman and Rutz have sent in their motor as will McFarland and Stevens send in their two. Waller, Miller and others have already had theirs changed.

Many bicycle track owners and race promoters are already announcing that motor paced and motocycle racing will be a feature of every meet. It is proposed to give open contests at various distances and some of them will be handicap events. In view of this, leading sprinters are ordering motocycle racing machines to add to their incomes derived from victories in the leg propelled contests.

Henshaw and Hedstrom, the motor cycle team, have invited Governor Roosevelt of New York, to make a trial mile on some six lap track, on their typhoon motocycle Governor Roosevelt is much interested in all sports and they propose to him that he learn to work the levers and enjoy the sensation of encircling a track at fifteen seconds for a sixth of a mile, promising him a sensation which beats climbing San Juan Hill. The governor's reply is anxiously awaited.

Abroad the bicycle sprinters and long distance men are becoming chauffeurs and are prominent in the motor vehicle and motocycle races. Henri Meyer, the Dutch sprinter, and Jean Fischer, the six-day man, both of whom competed in the Madison Square Garden races last winter, will be among the starters in the Paris-Roubaix race on April 15. The former on a motocycle and the latter on a bicycle. Gougoltz, the French sprinter, also a former visitor to this country, won the fifty-kilometer motocycle race at Oran, on March 10.

Frank Kramer, the amateur cycle champion last season, will follow the new fashion and train for sprint racing by doing fifteen to twenty miles morning and afternoon in his working out back of a motocycle. Jay Eaton trained in this way last fall and was the speediest of the sprinters at Madison Square Garden. Kramer has come to the opinion that the old change-and-change-about policy is out of date now and that greater speed than of old must be developed. This was the contention of Eaton in many an argument last fall. Harry Elkes proved last spring the truth of the assertion when he gave the sprinters a drubbing in one of the opening races of the season.

Elkes was anxious to follow up sprint racing, but his employers would not listen to his proposition. The motor men will make arrangements to do such pacing at so much per day per man and many have already made contracts with the sprinters. Newark will have several motor teams present from April 1, while ten teams will be seen at Louisville.

Harry Elkes writes to friends in this country that there are more styles of motor cycles in France than he ever believed it possible to manufacture. His pacing will consist of triplets and tandems of the double motor variety so he is certain that the pace will be fast enough to suit both himself and Ross. He is having made five special pace following machines on Orient lines, one of ninety-six, one of 108, one of 114 and two of 120 gear. The latter gear will be used by both Ross and Elkes in the Golden Wheel race in Berlin late in May, a four-day, three-hours-a-day contest.

With all the motors of equal horsepower in a contest there can be not the slightest question of doubt that the races of the present year will not only be fast and exciting, but also tests of real speed. The motors will add horsepower to the legs of the tandem teams and these men will have to train quite as regularly and systematically as they did when riding in the regular bicycle races. The motor cyclists realize this fact and they will be found at the training camps working out steadily on their singles with the other riders and taking advantage, at times, of their own pacing machines. Pacing teams organized for the year include those of Miller, who will have four men and two motors, Henshaw, who will have four men and three pace followers, Waller, who will also have four men and two or three pace followers, McFarland and Stevens, who will have four men and two or three pace followers, the Lawson brothers, with four men and two or three to follow, and many more. Several of the cycle tracks will also have regular pacing teams which they will rent out to middle-distance men with whom they contract for races and for pacing purposes in the training work of the sprinters. The motor cycle has, in fact, brough about a revolution in the cycle racing world and necessitates an entirely new style of training, as well as new methods of racing.

BECONNAIS.

Yclept "the King" of Motocyclists by His Fellow Frenchmen.

FUNCTIONS OF MOTOR-VEHICLE WHEELS

A THEORETICAL DISCUSSION OF THE STRESSES TO WHICH MOTOR-VEHICLE WHEELS ARE SUBJECTED, AND SOME OF THE FORMS OF CONSTRUCTION ADOPTED TO WITHSTAND THOSE STRAINS—EFFECT OF TIRES IN REDUCING STRESSES

The wheels of a motor-vehicle, says A. J. Wallace-Taylor, C. E., in the Motor-Car World, are members of prime importance, not only acting as a support, which is the case in all wheeled vehicles, but, furthermore, performing the office of propelling medium. The latter requirement necessitates the construction of motor-vehicle wheels being considerably modified to render them capable of bearing the various strains to which they will be subjected while in use.

Various Stresses

In addition to the weight which they have to support vertically, the forces which are brought to bear upon the wheels, and which they must be constructed to successfully withstand, are two-fold, that is to say, the one due to the side-thrust and pressure experienced when turning corners and when passing over roads the surfaces of which are not smooth, and over stones and other impediments, and the other which is caused by the rotary twist of the motive power. It will be seen, then, that each of the spokes of an ordinary carriage wheel may be considered to be an upright loaded column subjected at one of its extremities to a normal strain equal to a portion of the effort of driving, the value of which strain it is, however, practically impossible to accurately determine, inasmuch as all the spokes are not equally affected, and a mean obtained by dividing the gross effort of driving by the number of the spokes in the wheel would certainly be misleading in practice.

Again, as regards the weight or load supported by the wheel, it is clear that such load is not borne solely by the spoke which happens to be for the time being in a line perpendicular with the ground, but jointly by all the neighboring spokes, and the spoke situated diametrically opposite is operating to assist the driving of the vehicle.

Methods of calculating the strains of wheels have been proposed, notably that of De Mastaing, but they are too complicated for ordinary use, and are besides of uncertain accuracy. Consequently it has been found better in practice, owing both to the above fact and also to the variability of the load, in combination with the strains due to the application of the brake, and the shocks experienced when running over the road surfaces, all of which are incapable of being estimated with any degree of certainty, to construct the wheel stronger or lighter, according as circumstances and previous experience may suggest.

Wide Hubs Desirable

To minimize the twisting action on the spokes due to the motive power, the driving power is frequently applied as near the rim or felly of the wheel as possible; and to reduce as far as practicable the side-thrust pressure it is found desirable to form the hub bearing, in the case of rotating wheels, as wide as possible. A wooden wheel having broad spokes has decided advantages as regards capacity for withstanding side-thrust, a pressure, by the way, which may greatly exceed the strain which is exerted from the driving point to the rim. In spite of this fact, however, metal wheels, comprising steel rims and tangent spokes, are in the majority of cases superior for obvious reasons, and by a proper arrangement of the metallic tension spokes should give ample strength to resist side-thrust. To reduce the height of the body of the vehicle from the ground it is advisable to employ wheels of small or medium diameter.

Metal Hubs Necessary

Every wheel must comprise four distinct parts: First, the hub or nave and the axle-box; second, the spokes; third, the rim or felly; and fourth, the tire.

In the case of motor-vehicle wheels, wooden naves or hubs are inadmissible,

and these latter are, or should be, invariably constructed of metal, and serve at the same time as axle-boxes. The spokes used are both of wood and metal, the latter being as a rule only employed for light cars and motor cycles. The best woods for spokes are probably oak and acacia.

Spokes Work Loose

The strength of a wheel is entirely dependent upon the connection of the rim or felly with the hub or nave through the

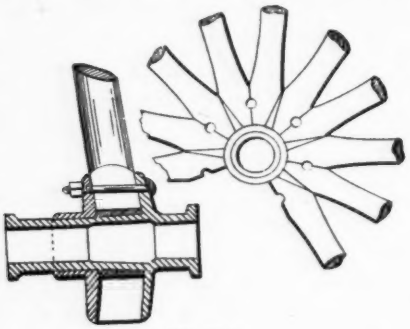


Figure 1.

spokes. As a result of the shocks experienced in passing over uneven road surfaces, and from the effects of variations in temperature, it is frequently found, after a certain amount of service, that the spokes work loose in both the rim or felly and nave or hub. To obviate this, the plan illustrated in Fig. 1 has been devised by Mr. Gerard, in which it will be seen that the hub has mounted upon it a conical or taper ring or sleeve, upon which rest the wide ends of wedge-pieces placed between the joints of each pair of spokes. The spokes, wedges and taper sleeve are kept in place by a fixed and a movable flange or collar, secured together by bolts passing through the spoke joints not fitted with wedge-pieces. It will be seen that any slackness due to shrinkage of the wooden spokes can be taken up by tightening up the loose flange or collar, which, through the taper sleeve, will tend to force the wedge-pieces between the spokes.

One Method of Construction

Fig. 2 shows portions of hubs and methods of securing direct and tangent wire spokes thereto. It is, of course, understood that in the case of wire spokes the weight of the load cannot be supported upon them, as those which may be for the time being located below the hub or nave would naturally give or bend, and it is these latter which take up the driving effort. The nave or hub is thus in a manner suspended from the rim or felly through the spokes situated uppermost. Direct spokes are secured to the rim or felly by heads, and to the hub by adjustable screws, such as shown in the illustration, or by some equivalent arrangement. Tangent spokes, on the contrary, are secured to the hub flanges by means of heads, whilst the adjusting screws are located in the hub or nave.

Advantage of Tangent Spokes

By reason of the driving effort being developed in a direction tangential to the circumference of the wheel, it will be seen that the tendency of direct spokes during work is to bend in the plane of the wheel, and by reason of their feeble resistance in this direction they tend to become inclined in a direction corresponding to the movement of the vehicle, a result which, by the way, first suggested the employment of tangent spokes. So that a wheel fitted with tangent spokes may be moved indifferently in either direction, the spokes so arranged that one half are inclined in one direction whilst the other half are inclined in the opposite way.

Numerous patterns of hubs are used for steel wire spokes, two amongst which are

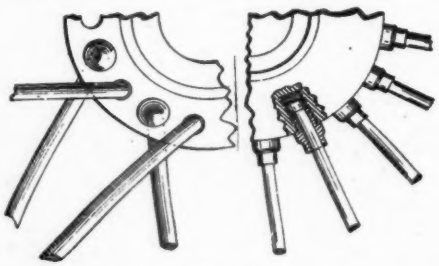


Figure 2.

illustrated in Fig. 3, the construction of which will be readily understood from the drawing.

Choice in Mounting Wheels

It may here be remarked that there are two plans available for supporting the wheels at their centers, both of which are equally applicable to both steering and driving wheels. One of these plans consists in mounting the wheels to rotate

upon a rigidly fixed axle, and the other in firmly securing the wheels upon the ends of an axle arranged to rotate in suitable bearings on the vehicle. With the first arrangement the driving wheels must be each separately geared to a motor or to an intermediate driving shaft, the most usual arrangement being to place the bal-

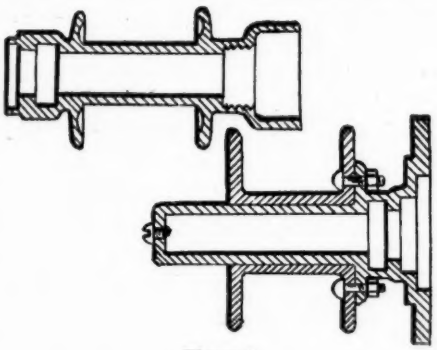


Figure 3.

ance gear in the intermediate transmission shaft, which latter is split, and each half is connected to one side of the driven balance gears. In such cases as where some form of clutch or ratchet device is used to produce the requisite differentiation of travel in the two driving wheels, this mechanism may be applied directly to the wheel hub between the driven member and the wheel proper.

Various Differential Gears

With wheels fixed to a rotating axle the latter may be split and the two halves connected together by a suitable balance-gear mechanism, the central member of which is driven. Another plan is to employ some form of clutch mechanism on both sides of a centrally-driven power wheel, or a continuously rotating axle may be used, to which the wheels are connected by means of clutch or ratchet devices. The use of the fixed axle, with rotating wheels, for steering admits of practically any type of steering gear being employed. The fixed wheels and rotating axle arrangement, on the other hand, render it necessary, or at any rate advisable, to have a continuous axle, and to employ some fifth wheel or an equivalent method of steering.

An important factor in securing the best possible tractive results is the type of tire adopted. Both steel and rubber tires have been used, but, at any rate as far as light and medium weight vehicles are concerned, the experience has been decidedly in favor of the latter. Among the advantages gained from the use of the resilient tires may be mentioned the better tractive results due to the reduction in side thrusts, both in the case of the drivers and the steering wheels, the enhanced comfort due to the cushioning effect, and the greater longevity of the vehicle and mechanism owing to the decreased vibration.

The Theory of Road Resistance

On a perfectly plain surface and at slow speed a hard tire would theoretically roll with the least resistance, but, in practice, no such road surfaces exist, and consequently the balance is in favor of tires having a certain amount of resilience, such as pneumatic tires, and by their use what is known as road resistance is greatly reduced. The reason for this effect is not far to seek. The surface of ordinary roads consists of an innumerable amount of small obstructions in close proximity to each other, and each of which obstructions has to be got past in some manner; or else the surface takes the form of a soft and yielding one, into which the wheel sinks, and out of which it must also rise.

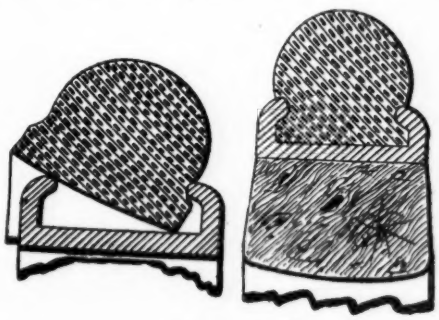


Figure 4.

In the case of a hard and unyielding tire the obstacles are surmounted either by the wheel rising over them, or by its crushing them into the road surface, thereby requiring the expenditure of a considerable amount of force; nor is the solid tire any more advantageously situated in the case of soft ground, for in this case it must in revolving either crush down the incline situated in front of it or else surmount it.

With the pneumatic tire, however, these obstructions are far more easily overcome, being, so to say, swallowed up, or at any rate, partially so, by means of the elasticity or give of the tire, and the rising of the wheel over the obstruction is thus entirely eliminated, or, where this is not the case, the distance through which it is forced is reduced to a very considerable extent. The same principle of operation enables the wheel fitted with a resilient tire to extricate itself with greater ease from a soft or yielding surface.

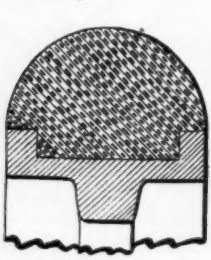


Figure 5.

Figure 6.

Percentage of Gain Under Tests

The experiments of M. A. Michlein have proved that the application of pneumatic tires to horse carriages gives the following gains when moving at a trot: Upon hard and approximately smooth surfaces, such as good wood or stone pavement, or new macadam in a dry condition, twelve per cent; upon the same surfaces, in a wet condition, twenty per cent; and upon bad, uneven pavement, or rough macadam, thirty-three per cent. At a walking pace the results become less favorable to the pneumatic tire, and the amount of the gain from their use increases in corresponding ratio to the acceleration on speed and to the weight of the vehicle. The results of these experiments, it will be seen, quite bear out the theoretical deductions made respecting the use of resilient tires.

Some Types of Tires in Use

It would be impossible within the space at disposal to go with any amount of detail into the description of the almost innumerable patterns of solid, cushion and pneumatic tires that have been brought out, but those shown in Figs. 4 to 7 serve to illustrate the types in most general use.

Fig. 4 shows two styles solid rubber tire adapted to be secured to the rim or felly of the wheel by forcing it into a groove or narrow mouth, an arrangement which affords the advantage of the tire being placed in position anywhere, and at any time, but, on the other hand, is hardly secure enough for fast speeds. In the right-hand cut the steel tire is fastened to a wooden felly.

Fig. 5 shows another pattern of solid rubber tires, in which the tire is secured by cement, a method preferred by many.

Fig. 6 illustrates a cushion tire secured to the rim by wedge action.

One of the many forms of pneumatic tires in use on motor-vehicles is depicted in Fig. 7, this type, which is the invention of M. Michlein, being a great favorite in France. The construction of this tire, which is of the built-up type, is secured on the rim on the wedge principle, will be readily understood without further explanation.

The Selection of Tires

Whatever the pattern of pneumatic tire chosen, care should be taken to see that it

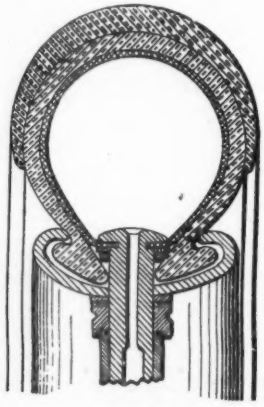


Figure 7.

is one which is, as far as practicable, of a construction impervious to injury, and should preferably be of the protected type. If not of this description, however, the thickness of the material should be ample. It is also desirable that a sufficiently wide base of contact be given the tire.

THE AUTOELECTROPHOBE

AN ANALYSIS OF THE ATTACKS MADE BY THE "EDITOR AND PROPRIETOR" OF THE HORSELESS AGE ON ELECTRIC AUTOMOBILISM WITH SOME PERTINENT COMMENTS ON THE GENERAL CHARACTER OF THE PUBLICATION

In considering the mental equilibrium and moral texture of men who occupy public or quasi-public positions, it is sometimes difficult to classify them properly. It is not uncommon for men of this class to use their influence in attempts to mold public opinion in directions which every man of sound judgment knows to be utterly and unqualifiedly wrong.

In such a case it is often difficult, knowing that the man belongs in one of two classes, to tell whether to set him down as a fool or a knave.

In some instances the characteristics of each of the two classes are both so prominent and so intimately interwoven as to make it apparent that he is the typical embodiment of feeble intellect and moral laxity.

Such is the autoelectrophobe.

E. B. Ingersoll, "editor and proprietor" of the Horseless Age, is the autoelectrophobe to whom reference is made in the present instance.

Reason for the Expose

In justice to itself, the Motor Age wishes to state in the beginning that it has no grudge against Mr. Ingersoll either as "editor" or "proprietor." It does owe a duty, however, to such of its readers who may have been misled through the untruthful and vicious diatribes, which, in his capacity as editor, he has seen fit to foist on an unsuspecting and—in knowledge of the motor-vehicle—an ignorant public.

If there were no other reason for calling attention to Mr. Ingersoll's misstatements, other than the fact that he sees fit to publish them, the Motor Age would not waste its space in any discussion of such idle vaporings.

A Little History

However, Mr. Ingersoll has made for himself—give the devil his due—a place in automobilism which entitles him to more than passing recognition. He saw that there was a great future in the motor-vehicle business more than four years ago, and, evidently impelled by a desire to reap some of the profit that must eventually accrue from the business, started the publication of the Horseless Age. He has posed as an authority, and, by those who have not followed the progress of his paper carefully and who have little information concerning the business themselves, he has been largely accepted at his own estimation and has been given credit for knowing something.

It is for this reason that the Motor Age feels that it is doing a service in the line of its duty as an organ of automobilism in lancing a noxious tumor on the industry, before it becomes still more noxious.

The Publication Analyzed

He is not an editor and never could be made one. His sheet proves that. It violates all the long accepted rules of newspaperdom.

A letter of inquiry reaches the publication office. If the editor cannot answer it, it is published without comment. It helps to fill space. The British public tolerate such nonsense, but the Horseless Age is the first sample seen on this side of the Atlantic.

Almost invariably, when he does attempt to make a statement on his own authority, he makes an egregious blunder.

A fair sample of the care with which the Horseless Age is edited appears on page 18 of the issue of March 14, 1900. At the beginning of the page is a short letter from Hudson Maxim, calling attention to an error in a formula in a manuscript, which he asks to have corrected. Immediately following is the very manuscript, transferred to print, with the incorrect formula almost in

line with the correction. Moreover, the formula shows on its face that it is incorrect. Still Mr. Ingersoll calls himself an editor.

If it gratifies his vanity to pose as an editor, he would be wise to hire a real editor and satisfy his vanity by merely posing.

Value of Contributors

The Horseless Age has, in the past, had a number of clever contributors who have used its columns in the absence of anything better. It is rapidly losing what few it has left. As a "collector and dispenser of other men's thoughts." Mr. Ingersoll was not a complete failure. When he attempts to follow a policy of his own, he is.

But if he is not a success editorially, what shall be said of him as an exponent of mechanical topics?

Gleanings From Foreign Sources

He has been a close student of the foreign publications devoted to the motor-vehicle industry. They are his prolific sources of "copy." But in his selections he is particularly unhappy and makes the matter worse by failing to tell the sources of his information, posing as the father of illy translated French, grabbing at the "inspired" contributions of the manufacturers for which many of the foreign papers are notorious, and entirely overlooking the articles of real merit.

The Patent Office a Friend

The patent office is a good friend to Mr. Ingersoll. It furnishes him a lot of copy. Until the Motor Age showed him the fallacy of his plan, he used to keep a supply of patent specifications on hand and use them to fill in when other copy was scarce. The Motor Age has given from the start a digest of the patents as they came fresh from the patent office. Now Mr. Ingersoll, "editor," uses them promptly. What he cannot compass, however, is the fact that some mechanical discrimination should be used.

Uses No Discrimination

He takes the patents as they come, gives liberal space to some worthless device, allowing the inventor to tell, in the complicated phraseology of his patent attorneys, the alleged merits of his invention. Some good things are cut down to unintelligible nothings. It would be too much trouble to select the good and discard the worthless, not to mention the labor of reducing to good English the patent office verbiage, even if the editor had the mechanical insight to enable him to do it.

The indiscriminate placing of illustrations with articles to which they do not belong makes the patent department of the Horseless Age a hideous nightmare.

"A Monumental Bluff"

As a newspaper man Mr. Ingersoll is, in the language of the street, a "monumental bluff."

And now he is an autoelectrophobe.

He was not always one.

In October, 1898, in an issue devoted to "The Motor-Vehicle in the United States To-Day," he says, on his editorial page, under the caption, "The Electric Procession":

"What a magnificent array it is. The electric vehicles which grace the pages of this issue and the boulevards of our chief cities! Distinguished by form and artistic design, elegant finish and solidity of construction, they are, indeed, a credit to the carriage builders who designed them as well as to the engineers who specified the electrical equipment."

Pretty strong for an autoelectrophobe, hey? especially when followed by seventeen pages of descriptions of electric vehicles.

Change of Views

But he was not an autoelectrophobe then. What changed him the Motor Age does not know, but it can hazard a guess. He then carried advertising of electric vehicles. He does so no more.

In some manner or other he has succeeded in convincing himself that it is good policy to antagonize and decry everything electric.

He has constituted himself the champion of the great moneyed public who is in need of protection from stockjobbers. The role of the righteous exposer of schemes to separate the unwily from their money pleases him and he

adheres to it with a tenacity more sticky than commendable.

He proclaims himself fearless.

Foolhardiness

His fearlessness is the kind that is known as foolhardiness.

He is not the only one who has exposed the schemes of stock-jobbers, but he is the only one who has harped on them to the extreme of nauseation—the only one who has continued to hurl philippics at dead and buried schemes.

He continues to damn the "lead cabs," as he designates them, after the annual reports of some, at least, of the companies have shown remarkably well, and with them he decries electricity for all motor-vehicle uses.

If electric motor-vehicles are the absolute failure that the Horseless Age would have the public think, how is it that the makers of these vehicles are constantly increasing their plants to meet the demands? How is it that we see them in successful operation all over the country? Why is it that the demands of the export trade are daily increasing?

Room for Investigation

But possibly Mr. Ingersoll, in his capacity as mentor to the industry, has failed to visit some of the mammoth factories. Let him visit the big Woods factory at Chicago, or the Riker factory at Elizabethport, N. J., or the Waverly plant at Indianapolis, or the Columbia at Hartford, with its thousand employes, or, if he has not the time to do that, let him take a ferry from New York and go to Hoboken and inspect the American plant, but just removed to that place. And these are by no means all of the factories. Let the mentor travel and learn.

It is a pity that a paper less than five years old should already be in its second childhood.

Let it be said, in conclusion, that the Motor Age holds no brief for the electric vehicle more than it does for any other tested and tried means of self-propelled locomotion, the object of the foregoing being to show the folly of utterly condemning a thing that is entirely practical, although by no means perfect.

For Mr. Ingersoll to try to persuade the public differently is to make a fool of himself from a business standpoint, and a knave from a moral standpoint.

OFFICIAL TIME KEEPING RULES

In the racing rules drawn up by the French Automobile Club special regulations have been made to ensure that official timekeepers shall not only possess some technical qualifications but also that their timepieces shall be of superior mechanical construction, says the official bulletin of the committee on runs, tours, contests and exhibitions of the Automobile Club of America. No one at all conversant with timekeeping as practiced at the various racing events both in England and France will, we think, affirm that it is as accurate as it might and should be. and when records are "timed" to the fifth part of a second—and this small interval of time will not infrequently cause the record to pass from one holder to another—it is seen at once how essential and necessary it is that the time officially declared as that occupied during an event shall be the true time interval. Those interested in records will perhaps be surprised to learn that, from the scientific point of fact, very few of these records can be accepted as true time intervals, and, taking into consideration the very crude means employed at competitions, races, etc., to measure time, the best that can be said is that the time as deduced is but a rough approximation, which, owing to various errors that will be mentioned later, may be either very close to the true time or separated from it by a considerable time arrival. When we consider that the ordinary official timekeeper is not re-

quired to pass any chronometric examination, neither is it required of him that he should have had any technical training or experience in the accurate measure- For most purposes of sport an approxi- or on board naval or telegraph cable steamships, and that the instrument he employs has in nearly all cases a variable rate, and, further, that the personal equation of the timekeeper and the rate of his timepiece are unknown, it will be seen that these so-called records can rarely be deemed correct measurements of time. For most purposes of sport an approximation is near enough, but for astronomical or navigating purposes the method of the official timekeeper would be wholly inadmissible. Still, there is no reason why cycling and motor vehicle contests should not be timed with at least some approach to scientific accuracy much greater than that which obtains at present.

For the accurate determination of a time interval we require a special observer and a special timepiece. Both are subject to certain errors, which may be ascertained and allowed for.

As regards the observer, no two persons will observe the same phenomenon at the same instant. The difference between the actual time of an occurrence and its observed time constitutes the "personal equation" of that observer. This may be .1 sec. plus or minus, or it may be .5 sec. plus or minus. It varies in the same individual according to the state of health. In astronomical and physical observatories, surveying and cable steamships, where the accurate determination of time is essential to the proper performance of the work, this personal equation is always carefully ascertained for each observer. In order to show the influence that this very small time interval might exert upon a record, suppose we learn from the sporting press that a distance of 10 kilos. has been covered in 10 m. 40 s. by rider A. The same event takes place with another timekeeper, and rider B completes the distance in 10 m. 39 4-5 s., or, as we prefer to put it, following scientific usage, 10 m. 39.8 s. Subsequent testing of the observational powers of the two timekeepers reveals that the timekeeper for A has a personal equation of minus .2 sec., while that of the timekeeper for B is plus .2 sec. The corrected times would, therefore, be: A, 10 m. 39.8 s.; B, 10 m. 40 s. This case, although supposititious, is by no means impossible or unlikely. Nor are such personal equations as we have used unusual, as every astronomer or scientific navigator will admit. If, then, racing records are to be true records and not mere approximations, clearly the personal equation of each official timekeeper must be known, so that accurate comparisons of observed times can be made.

Dealing now with the instrument employed to measure time intervals, we should explain that no instrument keeps exact time—another surprising statement, and one that the official timekeeper will, no doubt, except to. Exact time can, however, always be ascertained providing the error and rate of the timepiece are known. By the error is meant the difference in time on a given date between the watch, chronometer, or clock in question and a standard clock or regulator synchronized from Greenwich, and the rate is the daily change in the error. If the latter be uniform, or fairly so, the time can always be ascertained with accuracy. Thus the problem of finding the longitude at sea consists essentially in determining the time at ship and noting at the instant of observation the time as shown by the chronometer, the difference between the two is the "meridian distance," which expresses the longitude. With a good chronometer and an expert observer very accurate results can be obtained. But in all time problems, whether they consist in timing a cycle race or determining the position of telegraphic cable buoy in the middle of the Atlantic, the absolutely essential condition is that the timepiece shall have a uniform rate. The "error" may be large or small so long as it is known; the rate may likewise be large or small, providing it is known, and that it be uniform, i. e., does not vary. We perhaps labor this point, but we do so purposely. Now, the marine chronometer is a very expensive instrument; a second-hand one good enough for ordinary navigation will cost not less than $100. In order to preserve a uniform rate the chronometer is carefully slung in gimbals and enclosed in an airtight box,

which is placed in another box, which is carefully cushioned. This latter box is then screwed down, and as far as possible the chronometer is kept free from all shock and vibration. The operation of winding is carefully performed at a stated time by a responsible person. No one but a qualified optician is ever allowed to touch the mechanism, not even to move the hands. Notwithstanding all these precautions an absolutely uniform rate, even in the best chronometers, cannot be ensured. The rate alters with temperature, and will not be the same at sea as in harbor. The variations are, however, usually very small, and it is quite possible to determine the time, either local or at Greenwich, with a limit of probable error of ½ second, or even less. Now, our point is this: Seeing it is so difficult to insure a uniform rate even in a specially constructed and expensive instrument as the chronometer, which will cost anything between $125 and $250, and considering also what care has to be taken to insure fairly accurate results, is it reasonable to assume that a similar degree of accuracy can be obtained in a watch which may cost perhaps $25 or $30, or say $50, and which is daily subjected to a course of treatment which is diametrically opposed to that necessary for chronometers If, as official timekeepers assert, they can obtain accurate results to the fifth part of a second with their what they so absurdly term "chronographs" — really they are nothing of the kind, because they do not furnish any "graph" at all—is it likely that such very commercial men as shipowners would pay, say, $500 for a set of three chronometers for a steamship when, pace the official timekeeper, they could insure equal results with a $25 split-second watch?

Let us now consider the treatment a watch receives at the hands of such "experts" as official timekeepers. In the daytime it is usually worn on the person, and so exposed to the radiant heat of the body. Its temperature will usually be between 70 and 80 degrees Fahrenheit, at times more. It participates in the oscillatory movement of the body, due to walking or riding. It also occupies a vertical position. At night-time it is usually placed on a table in a horizontal position, and exposed to the surrounding air, which may be anything from 30 to 80 degrees Fahrenheit, or more. Obviously, under such conditions a constant rate cannot be expected. As a matter of fact, the watch will lose in the daytime and gain at night-time. Even the best made English watches would show a variable rate—often a very variable rate—under such conditions. Again, in the hands of the official timekeeper another cause of disturbance is introduced, and one which renders accurate timekeeping simply impossible. The more mechanism and movements the British watchmaker can crowd into a watch, the more the latter commends itself to an indiscriminating public, especially the official timekeeping portion thereof. Hence we have a wholly unnecessary split seconds movement, and the dial is divided accordingly, and the watchmaker and the official timekeeper delude themselves and the public that they can measure time to the fifth part of a second. "How wonderful!" says the unsophisticated. "How absurd!" says the scientific observer or navigator.

Now, a watch we may regard as consisting of a motor and a train of mechanism. This motor has no governor, but it is regulated so as to drive the mechanism at a more or less uniform rate; consequently, when we throw in gear the center seconds movement we are putting more work on the motor, and so causing its rate of doing work to alter—in other words, we alter the time rate. Again, all mechanism possesses the quality of inertia; before that center seconds mechanism acts an amount of time—it may be infinitesimal, but still an amount—has to be occupied in overcoming the inertia of the mechanism, and similarly in stopping the center seconds movement, which action the official timekeeper thinks indicates time to the fifth part of a second, inertia still acts and tends to carry the movement on, and hence the angular displacement of the seconds hand is by no means, or necessarily so, a true time interval—it may have a limit of error of .2 sec. or .3 sec.

The center seconds movement is rarely seen in watches in which accuracy of going is the desideratum. It is never seen in chronometers nor in admiralty "deck"

watches. At the same time the movement can be advantageously applied to ordinary watches and used to measure small intervals with some degree of accuracy provided the conditions necessary for accuracy are complied with. It will be seen, then, that a watch used as described is liable to three very serious errors before we can say that a record is correct to the fifth part of a second. We must know not only the competency of the official timekeeper as regards his ability to observe, but also the chronological efficiency of his watch. Owing to the improvements in watch manufacture it is now possible to obtain watches that are really very accurate timekeepers. A watch may have passed the Kew test and may have the A certificate, but its subsequent good performance depends very largely upon the intelligent care bestowed upon it by its possessor. It does not follow that such a watch will be a good timekeeper after it has left the observatory, and hence time taken by it is not necessarily exact. Indeed, it is a wonderfully good watch that will maintain an efficiency of 50 per cent in the Kew classification for a few months. The Kew certificate resolves itself into little more than that the watch to which it refers is of such mechanical excellence that if properly used the time will be correct within certain stated limits of error.

We have laid stress upon the importance of a uniform rate in any instrument used for the accurate determination of time intervals. We have shown how, even in marine chronometers, this rate is variable. In the best watches, even when used with every care, the rate can very rarely be guaranteed to remain constant for a few days. When used by lay and unscientific persons such as official timekeepers, a "rate" is quite out of the question. So far as the writer is aware, no watches are made having a split seconds movement which is used intermittently that can be relied upon to have a uniform rate. As the result of some considerable experience in rating chronometers and watches, he has found that even in the best watches the rate is usually very variable. It is in timing events that occupy some few hours that the influence of the rate is so important. Thus, suppose we are timing an event that lasts three or four hours, and are using a good watch that has a gaining rate of 5 secs. per day. Let the apparent time be one hour, then it is easily seen that this will be in error by .2 sec., or, in the nomenclature of the official timekeper, 1-5 sec., and in an event lasting four hours this will be .8 sec., or nearly 1 sec. of time. That this is no supposititious case will be admitted, when we say that it tis quite a very common thing in using the very excellent "admiralty deck watches" to find an error of half a second plus or minus during a period of, say, three hours during which the watch has been taken ashore for the purpose of taking observations.

Bearing in mind the many sources of error,, personal and instrumental, which, as we have seen, the accurate determination of a time interval is liable to, even when trained observers and the best instruments are employed, it will be admitted that the determination of the time occupied in racing events by means of technically untrained men using comparatively very cheap watches with complicated and fancy mechanical movements must be liable to extremely large errors. In fact, such records as we see published in the cycling press are, from the scientific point of view, worthless, as they are merely "apparent times," and to render them "true times" they require to be corrected for many errors unknown as to sign and amount, the limit of error being certainly not less than 1 second and possibly 1½ seconds.

In order, then, to obtain the time interval of a racing event, the competency of the timekeeper to observe should be determined by examination and his personal equation ascertained and checked on the day of the race; the watch employed should be compared immediately before and after the event with a chronometer (not a railway clock), whose error and rate are known. In this way a very fairly accurate determination could be effected, and one which would command respect as to its reliability.

The subject of timekeeping is one which might well occupy the attention of all racing bodies, but more especially of automobilists, and we trust that the Auto-

mobile Club will, in framing its rules for racing, take steps to insure that the time-keepers are competent observers, and that the instruments employed comply at least with the admiralty standard of excellence.

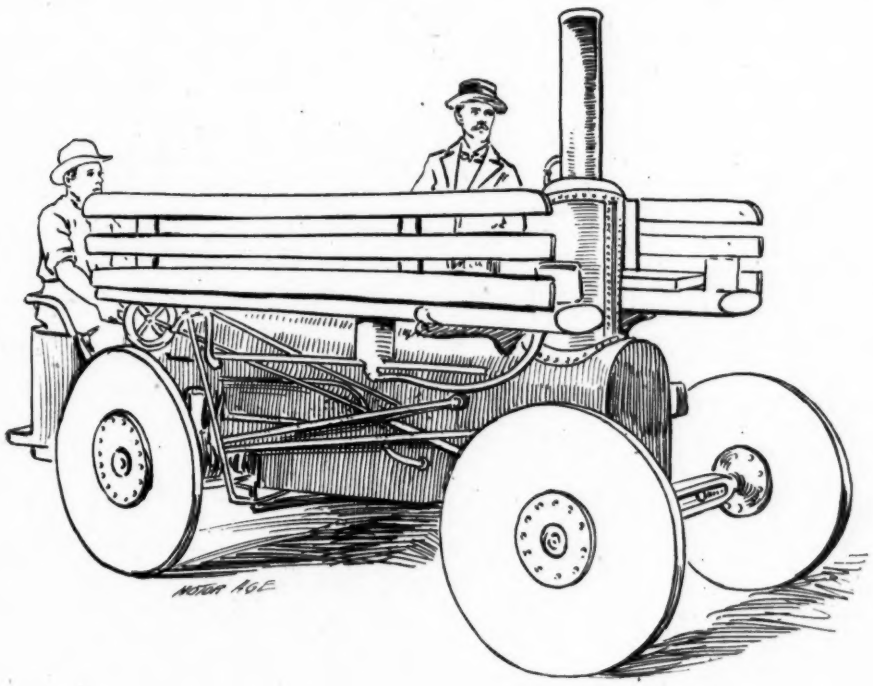
THIRTY-THREE YEARS OLD

This motor-vehicle is thirty-three years old—a ripe old age for a vehicle of this class—but it is still hale and hearty, and maintains, unimpaired, its appetite for food, which in its case is hard coal, pea size, with charcoal mixed with it occasionally, by way of variety.

It is now in the possession of Frank Dudgeon, Long Island.

It will accommodate ten passengers besides the driver, although the accommodations are not what could be called luxurious, as upholstery is a thing of which the vehicle is innocent, and there is no protection for the passengers from the heat of the boiler.

The cylinders have a four-inch bore and a fourteen-inch stroke—not exactly the dimensions approved by the cognoscenti of the present era, but they furnish power enough to send the quaint wagon along at a rate in excess of twenty-five miles an hour. They are very greedy of steam, however, being entirely exposed to the atmosphere, and the boiler is, in consequence, not of the midget proportions approved by the present regime. Nothing in the way of either condenser or silencer has been attached, and the exhaust is consequently very noisy and much in ocular evidence.



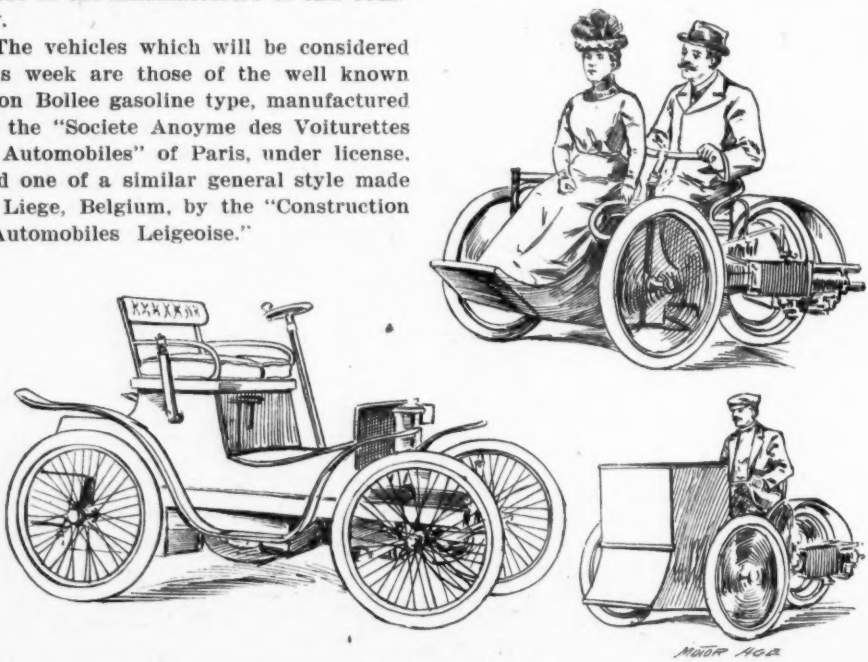
The steel tires, from which about one-

eighth of an inch has been worn away, are not strictly up to the mode of the present day, either, nor is the mat of cocoa fiber quite the approved boiler jacket. Yet with all its lack of pretentiousness, it contains the very necessary elements of durability, as its third of a century of knocking around on American roads certainly bears eloquent testimony.

TYPES OF FOREIGN VEHICLES

It is the intention of the Motor Age to give, from time to time, descriptions of the various types of vehicles which are meeting with favor in England and on the European continent, as a matter of general interest to its readers and as a guide to the manufacturers of this country.

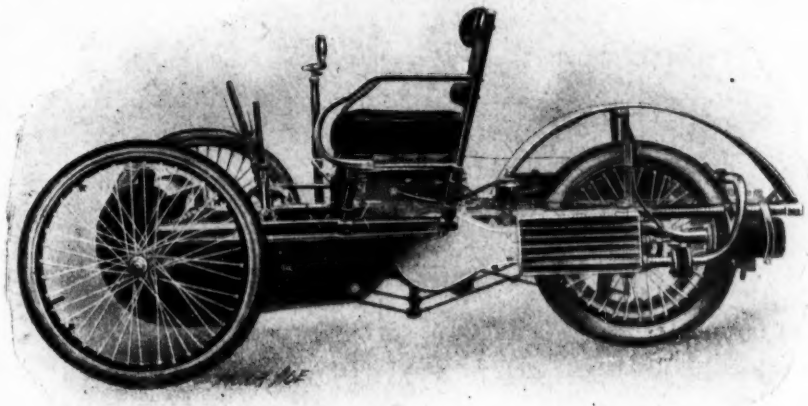
The vehicles which will be considered this week are those of the well known Leon Bollee gasoline type, manufactured by the "Societe Anoyme des Voiturettes et Automobiles" of Paris, under license, and one of a similar general style made at Liege, Belgium, by the "Construction d'Automobiles Leigeoise."



GROUP OF VOITURETTES OF PARISIAN MAKE.

These, with the others illustrated, are of the general type which is, at present, the most popular one in Europe, owing, doubtless, in a measure, to the price, and, besides this, to its portability by rail, its light weight, compactness, and the stability which comes from a low center of gravity. Indeed, the voitures or larger carriages follow these same features as nearly as possible in carriages of their size and horse-power.

The electric carriages described on another page of this issue of the Motor Age, together with their accumulators and motors, even follow, in general appearance, the same construction. These electrics are novelties in their French home, owing to the scarcity of any electrics at all, while in this country they would be novelties, not on account of their motive power, but on account of their radical departure from the accepted American lines

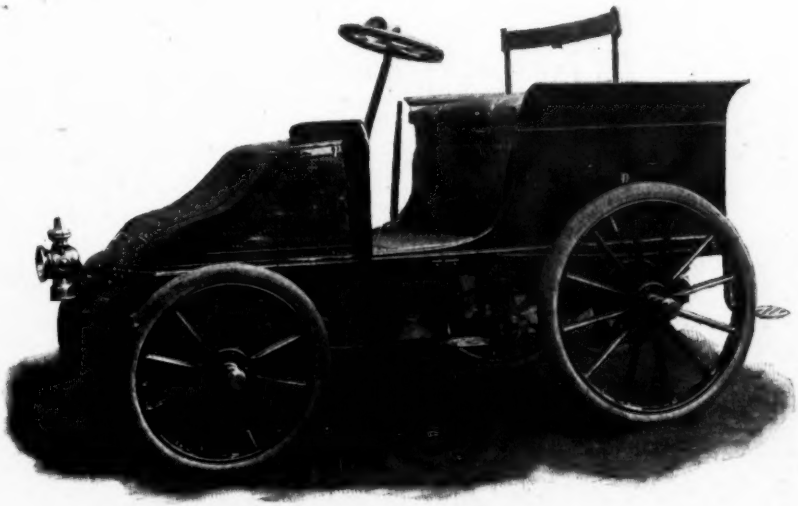


THE VOITURETTE MADE IN BELGIUM.

—of the horse-drawn-carriage-without-the-horse type.

The Paris company makes its voiturettes in several styles. The most popular are the tricycle class, with two steering wheels in front and one driving wheel behind. This class is provided with a single upholstered seat—not of the bicycle saddle kind—and is adapted to be used with or without a front seat, which latter can be obtained wide enough for only one person, or for two, or there can be substituted for the front seat a parcel carrier with a capacity of about ten square feet.

These tricycles are fitted with air-cooled four-cycle motors which can be obtained in three different powers, according to the demands upon them, all giving three speeds. They are also fitted with two cylinder motors, which give as high a speed as sixty kilometers (37½ miles) an hour, varying between that and twelve kilometers (7½ miles) an hour. Intermediate speeds are obtained through the method of power transmission which is



A TYPICAL FRENCH CARRIAGE—SEVEN HORSE-POWER—MADE BY CHARLES WILFORD.

accomplished by means of a belt the tension of which can be regulated by the driver.

The prices of these machines range from $500 to $600.

In addition to the tricycle class, the company is also putting on the market a four-wheeled voiturette, which is illustrated in connection with their tricycles. It is similar in almost every respect to the tricycle class but has two driving wheels, the motive power being transmitted to the differential on the rear axle. This vehicle sells at $750.

The second illustration is that of a tricycle voiturette of the same general style as those described in the foregoing, but seats the two passengers side by side. It is made at Liege by the makers of the Belgian Duryea vehicles, described in a previous issue of the Motor Age.

The particularly notice able feature of this voiturette is in the construction of the motor in which, contrary to general custom, the radiation fins on the cylinder and valve boxes are constructed parallel to the stroke of the piston, which, in a horizontal motor, gives a very free access of the atmosphere to the fins for radiating the heat, but which, on the other hand, requires a greater thickness of the cylinder, which is robbed of the strength of the circular fins. The illustration shows the construction plainly.

ANOTHER FRENCH CARRIAGE—THREE HORSE-POWER—MADE BY CHARLES WILFORD.

THE BUILDING OF THE AUTOMOBILE

This is a true story.

Read it and then if you do not think it is true, tell why.

* * * * * * *

Fred, a young man whose modesty prevents his being named in a more definite manner, is and has been much interested in the motor-vehicle, so much interested, in fact, that he pined and pined to build one. Sad to relate, however, he ekes out a meager existence by making illustrations for a hard-hearted company whose

business is that of publishing trade papers. Among these papers is one devoted to the motor-vehicle.

Now, in regard to Fred, it must be said to his credit that he has an excellent knowledge of how matters mechanical should look on paper, having graduated from a technical preparatory school, and having been engaged in making such drawings for a very considerable part of the time since he cut loose from the maternal apron string. The more pictures of motor-vehicles he drew and the more elevations and plans and sectional views he made of motors and transmission devices, and speed changing mechanisms and running gears and steering devices, the more he became persuaded that it was no difficult task to build a motor-vehicle and the more he pined that he did not have either the time or the wherewithal to devote himself solely to the construction of one.

He pined with greater effect, inasmuch as he is very handy with tools, so handy, in fact, that he has built a bicycle for himself and done many other things that require mechanical ingenuity and skill. He was thoroughly unhappy. He even "kicked" at the fate which compelled him

Exhibit A.

to expend all his ingenuity in building vehicles on paper when he was so well equipped mentally and by training to build the kind that would run on the road. And it is a grave case when Fred "kicks."

Outside his desire to give a practical demonstration of his mechanical ability, it must be confessed that Fred was influenced to some extent by the thought of the pleasure that he could get from the use of a motor-carriage, after he should

Exhibit X.

have built it. But the anticipation of this pleasure was dimmed by the remoteness of his realization. Now Fred is of a sociable and confiding nature. If he were not this story would not have been written. Just like a great many other people, he likes to have his acquaintances know how really clever he is. It was for this reason that he confided to his associates in the editorial rooms his belief in his ability to build an automobile that would put to shame many of those that were being offered to the public; that he lacked nothing but time, materials and machinery to do it; and that he would never be thoroughly happy until he had done it. It made no difference that they scoffed at him and expressed doubts as to his ability. That did not change his opinion in the least.

In the course of time he confided this secret to the wide world, or as much of it as he numbered on his list of acquaintances. Among the latter was a manufacturer who had given some thought to embarking in the motor-vehicle business. He had hesitated because of his lack of knowledge of the requirements of automobiles. But after he had heard the embryo genius discourse learnedly on the

requirements of automobilism, from the mechanical standpoint, he began to take a hopeful view of the problem.

In short he was induced to make Fred on offer. The offer was this: That Fred should furnish the working drawings for a vehicle which should cost not more than $500 to build. The manufacturer would build two of the vehicles and would give Fred one for his work in designing.

Fred was elated. He at once took the wide world, or his part of it, into his confidence, varying his tale from a recital of his ability to build to his intentions and plans for building.

In the first bloom of his enthusiasm he sat down to draw—not plans for his motor-vehicle-to-be—but forecasts in black and white of what he would do when he really got to work. He submitted them to one of his colleagues, one of the fellows who writes, and suggested that they would furnish food for a story, a story of how a clever but inexperienced man built an automobile. The pictures were similar to those which accompany this story.

"But what are these pictures supposed to represent?" asked the writer.

"Humph! Any chump could tell that," answered Fred.

The writer hesitated and then inscribed

Exhibit Z.

the pictures as they are inscribed in this story.

"What does that mean?" asked Fred.

"Humph! Any chump could tell that," answered the writer.

Fred scowled and scratched his head.

"The known quantities," said the writer, after a pause, "are represented by the first letters of the alphabet—in this instance by A—and the unknown quantities by the last letters—X, Y and Z, in this case."

Exhibit Y.

"You go to!" shouted Fred, and left in a huff.

A few days later he became better natured and asked the writer for formulas for laying out a gasoline engine. The writer gave him formulas which dealt in logarithms and Xth roots. Then Fred got angry again, but the writer offered to help in working out the formulas when Fred should have decided on just what type of engine he wished to construct, and Fred was appeased.

But the writer was not the only person whom Fred consulted. Anyone and everyone who could be induced to talk automobile construction was questioned and cross-questioned. Fred drew plans and then offered them for criticism. The writer and others whom he consulted were not backward in criticising. When an adverse criticism was offered, Fred would scowl and demand the reason for the criticism—and would get it. Then he would tear up his drawings and begin over again.

It is now four months since he began his designing, and goodness knows how many sets of drawings have been consigned to the w. p. b.—which, in newspaper parlance, means the waste paper bas-

ket—and how many new sets have been begun. Still the complete drawings are not ready to submit.

All the unkind things that Fred's friends have said about the troubles that he would have when his plans were once accepted and work commenced have had little effect on him, save to make him cautious. Likewise the number of dinners that he will have to buy, if the vehicle does not spin over the road, makes him cautious. He has not yet abandoned his task, but certain hints have been dropped which would lead one to think that he may possibly abandon even the glorious prospect of coursing over the country in a vehicle of his own design, rather than run the risk of buying all those dinners. He has received offers of help, if he would only sacrifice an interest in the vehicle, but he has steadfastly refused. He would rather have that vehicle all to himself, if only in fond imagination, than to share it in reality with anyone.

And still X, Y and Z are unknown quantities.

MINOR NEWS AND COMMENT

IN WASHINGTON SOCIETY

Washington, D. C., March 24.—The various people constituting Washington society are evincing marked interest in automobiles and automobile parties are now the reigning fad. Secretary of the Treasury Gage gave a theater party recently and each one of the guests was conveyed to the place of amusement in an automobile. The Baroness Hengelmuller, wife of the Austrian minister, and one of the most popular women in the national capital, is the owner of a handsome electric vehicle of the Victoria type, and also of an English vehicle of unusual height. The latter is of dark blue enamel, and is upholstered in light drab. The baroness has become an adept at operating these vehicles, and almost every morning she can be seen upon the streets and in the parks.

Every day just at the noon hour a handsome electric vehicle dashes up to the Capitol bearing a prosperous looking man. It is Senator Wolcott, of Colorado, and he has become a firm believer in the automobile.

"It runs easily and swiftly," he says; "it is safe and convenient, and it is inexpensive. Instead of keeping several horses in your stable, all you have to do is to run your automobile down to the power station once in a while."

Among other well known people who have adopted the latest mode of traveling are the French, Russian and British ambassadors, Senator Lodge and Senator Depew, and Secretary of State Hay.

Miss Annie French has the distinction of being the first woman in this city to obtain an engineer's license. Miss French is the owner of an automobile and in order to be able to operate it herself, she appeared before the proper board and took the regular examination given to other candidates for a steam engineer's license, which a police regulation requires every operator of a steam vehicle to have.

AUTOMOBILE CLUB DOINGS

New York, March 24.—There will be a special meeting of the Automobile Club of America on Tuesday, the 26th, the main object of which will be the selection of an official representative of the club at the race for the international cup in France on June 14. Albert C. Bostwick, the chairman of the committee having the challenge in charge, will doubtless be selected and will sail on April 18.

The club is now wrestling with the question of club emblem designs, to be worn on the uniforms and to be emblazoned on the vehicles. Those already submitted run too much to winged wheels of the much used bicycle club pattern and

give no suggestion of a self-propelled vehicle. Here is a chance for some ingenious designer to win fame by furnishing the emblem for the national automobile organization of America.

Another attempt will be made next Saturday to pull off the first spring run of the season, which, owing to blizzard conditions, became a snow plowing match at the first attempt.

Club nights have been established on Tuesdays and Saturdays and on these evenings the rooms at the Waldorf-Astoria are filled with the "autofans," if Motor Age may be permitted to coin a new word for automobile enthusiasts suggested by baseball lingo.

THE KAISER OFFERS A PRIZE

Figaro publishes a sensational item recently to the effect that the German kaiser has offered a prize of 80,000 marks, or $20,000, for the best war automobile. Experiments conducted for some time past have shown such satisfactory results that they induced kaiser to offer the prize, thus showing what importance he thinks the motor-vehicle will play in future wars.

KNICKERBOCKER CLUB LECTURE

New York, March 22.—Denizens of clubdom being especially eager for automobile information, the Knickerbocker Athletic Club members had Hiram P. Maxim of the Columbia Electric Vehicle Co. preach the gospel of the motor-vehicle to them in the gympasium this evening. The lecturer gave a practical demonstration on the spacious floor with an electric runabout and a gasoline delivery wagon.

The lecture was purposely elementary, as was desirable in view of the fact that his audience was made up mainly of novices and new converts.

The advantages of the electric machine, he declared, were extreme "sweetness" of movement, elegance and simplicity of operation and control. Their disadvantages were the short mileage permissible, their weight and their cost. He thought, however, that the greatest development would take place in electric automobiles of all others.

Gasoline machines were favored for their lightness, speed and unlimited distance of travel. The public, however, was not yet "up to" their operation fully, and was inclined to see first their defects, particularly that of shaking when not in transit.

Steam automobiles were the swiftest and lightest of all, but forgetfulness of the operator was dangerous, particularly if it involved the absence of water in the boiler.

AUSTRALIAN NOTES

Sydney, Feb. 27.—Ere these lines appear in print, the automobile will have made its first appearance in New South Wales. Mr. W. J. C. Elliott, the proprietor of the Sydney Aùstral Cycle Agency, who has been in Europe for the past six months,, is bringing out three of the De Dion Bouton motor carriages with him. They are expected to arrive in Melbourne on February 28, and will be run overland to Sydney, a distance of 580 miles. This will be a good test for the cars.

There is some talk of the Thompson Steam Motor Car Syndicate of Victoria being floated into a big company and capital provided for the building of a number of motor-vehicles.

At a recent meeting of the Northcote council, Victoria, a discussion ensued as to whether a tram service should be re-established in that municipality, or whether a motor-vehicle service would be better. Figures were gone into and it was clearly shown that there would be an immense saving if a motor-vehicle service were adopted. The council will come to a decision on the matter early next month and it is very probable that it will adopt the motor-vehicle scheme.

An automobile operator, according to the rules laid down, must be able to use both hands and both feet, says an exchange. What's the matter with his making some use of his head occasionally, also?

The Dennison Electrical Engineering Co. of New Haven, Conn., has begun work on a large motor omnibus which will be run next summer between Torrington, Litchfield and Bantam Lake.

NEWS OF THE MOTOR INDUSTRY

A LIBERAL SUPPLY OF GASOLINE MOTORS TO BE HAD BY ALL WHO DESIRE TO PURCHASE THEM IN THE FUTURE—OTHER NEWS OF THE TRADE

SUPPLY OF GASOLINE MOTORS

New York, March 24.—With the demand for motor tricycles and quadricycles have come efforts to secure a supply of motors equal to the growing demand. The Waltham Mfg. Co. now has made arrangements not only for an adequate supply for its own use, but will have them to sell to makers in the open market.

The Waltham people have generally been regarded as controlling the De Dion motor in this country. So they did practically when the demand was so comparatively small and confined for the most part to those needed for the Waltham company's machines, for by their agreement with Kenneth A. Skinner, who prudently captured the De Dion agency for this country three years ago, they were to have the first call on fifty of these motors a month.

The Waltham Company's Output

The Waltham output of tricycles and quadricycles has averaged one a day and will now reach two until the work of turning out Orient bicycles is over for the season at the factory, when the daily output will be four machines per day. Of course with this increase the De Dion fifty a month would prove insufficient, and accordingly the Waltham company has secured the control of the Aster motors for this country, which have been the rivals of the De Dions abroad. With this acquisition not only will there be sufficient Asters for the Orients, but enough over to sell to the general trade.

DeDion on Open Market

Kenneth A. Skinner will also sell De Dions in the open market. Excellent American motors can also be had from such well known concerns as the Crest Mfg. Co. of Dorchester, Mass., and others who are furnishing the motor power to the makers of other brands of tricycles and quadricycles now being made known.

The Pope department of the American Bicycle Co. has been experimenting at Hartford and will at once begin to turn out motocycles, tricycles and quadricycles.

E. C. Stearns to Make Motocycles

The concern with which E. C. Stearns is connected has secured the abandoned Barnes factory at Syracuse and will also engage in the manufacture of tricycles and quadricycles, in whose development Mr. Stearns has long been interested and in fact was a pioneer, as his exhibits at the cycle shows will prove.

There has been a rush for tricycles and quadricycles at the stores including these machines in their line. For instance, the Waltham company has been deluged with telegrams from the Wanamaker motor vehicle store in this city asking that motocycles be rushed in view of the fact that customers are depositing cash with their orders to secure, if possible, quick delivery.

Demand From Bicycle Dealers

Leading bicycle dealers are receiving many inquiries for motocycles and are looking about for tricycles and quadricycles to add to their bicycle lines. The rush to the dealers for these machines proves that Cycle Age's and Motor Age's repeated contention that the public regards the bicycle agent's store as the legitimate depot for motocyles has been correct. One cycle making concern, which also manufactures motocycles, is reaping the advantage of its foresight and adding to it by giving its agents the first call for its motor vehicle agencies. Other bicycle dealers will probably not be slow to add motocycles to their output.

Detachable Tires and Steel Rims

Motocycle and quadricycle manufacture, to which so much attention is now being devoted by bicycle and automomobile makers, has brought about a renaissance in the demand for detachable tires and steel rims. The International Automobile & Vehicle Tire Co. has secured the right to manufacture in this

country the Michelin tires, so popular for this class of vehicles abroad. The G. & J. and the Dunlop double tube tire factories are feeling the influence of this demand and preparing to meet it. Doubtless other makers will resume the manufacture of this variety.

DE DION MOTORS ON SALE

Boston, March 25.—Kenneth A. Skinner, by the way, has just opened a new depot at 268 Massachusetts Avenue, which is already the "motor row" of Boston, and will sell and rent Orient machines fitted with de Dion motors. Charles S. Henshaw, of motor pacing fame, is associated with him. He has one of the best locations on the "row," close to the extensive park system, and should do a gilt-edged business.

A newcomer is the Boston Automobile Co., which occupies the store and livery at the corner of Boylston Street and Massachusetts Avenue. Paul Hunt is general manager and Thomas McCullough, one of Boston's motor pioneers, is "surgeon in charge" to sick motors. Whenever steam or gasoline drivers get into trouble nearby, they jump the sidewalk and are let in through big folding doors, afterward being sent on their way rejoicing. This company will build, sell and rent gasoline carriages.

The electric wagons seem to be taking a strong hold. Houghton & Dutton, dry goods, have joined the storage battery ranks and have leased fifteen delivery wagons from the New England Electric Vehicle Transportation Co. The newspapers are beginning to see the practical side of power carriages and the New England News Co., which does the bulk of the depot and suburban newspaper delivery, has several wagons from the same company in active and practical operation. The time saved in catching trains is what appeals most strongly in a business where time saved is one of the essentials of success.

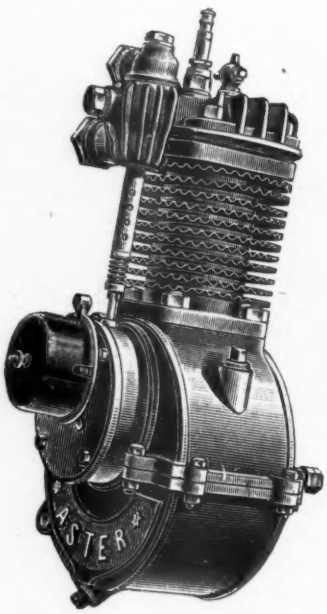
FITCHBURG TO BUILD AUTOS

Fitchburg, Mass., March 25.—The Iver Johnson Arms & Cycle Works are to enter the automobile field. Fred I. Johnson of the company visited Boston the other day and spent several hours inspecting different makes of steam boilers and engines. The company intends to build steam vehicles of all descriptions and is well supplied with machinery to make most of the parts required.

At first it is the intention to purchase boilers and engines in the open market, but ultimately nearly every factor of their carriages will be made in Fitchburg.

WALTHAM-ASTER MOTORS

The most important piece of news in the automobile trade during the past week is the announcement that the Waltham Mfg. Co. have secured the exclusive American agency for the Aster



The Aster Motor.

motor, made by the Aster Motor Co. of Paris, France, and in future they will fit their tandems, tricycles and quadricycles with either the De Dion or Aster motors.

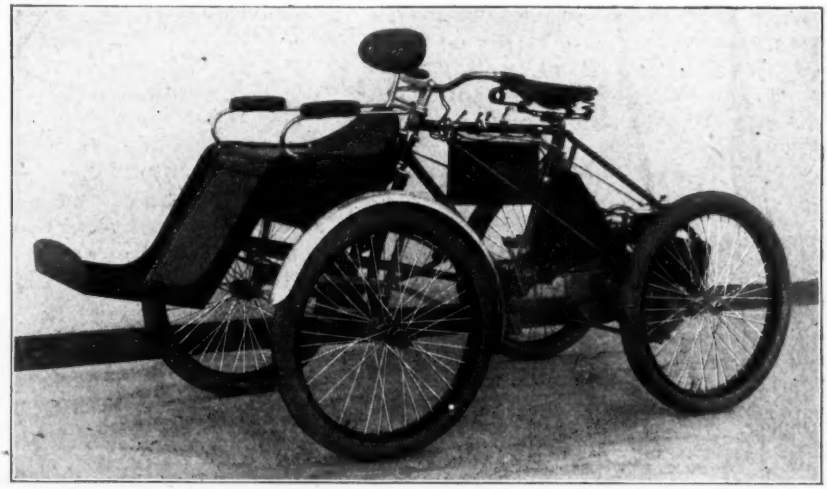
The motor cycle has been very extensively used in France, but the American mind has turned to the motor carriage, and the Waltham Mfg. Co. was

the first firm to build and market a motor cycle, and a number of their motor tandems were marketed last spring and summer and were used in paced races throughout the country. This winter they brought out and are now delivering tricycles and quadricycles. It has been generally conceded that their motor tandem is much more graceful in appearance than any that have been produced on the other side, and as will be seen by the accompanying cut, the Orient quadricycle certainly presents a more elegant appearance than the pictures we are accustomed to see of the French quadricycles.

As will be seen from the illustration, while similar in many respects to the De Dion, the Aster present a somewhat different appearance. The De Dion motor is cooled by flanges cast on to the cylinder, while the Aster is cooled by corrugated copper flanges compressed around the cylinder head. The Aster company have a patent on their cooling device and claim that it is superior to the other in that copper is a better conductor of heat, hence a better radiator than iron, and that on account of the corrugations the flanges have a great deal more cooling surface.

The De Dion and Aster motors are the two best known and most widely used motors of this type in the world, and with its reputation for high grade goods, together with ability to supply either of the above motors, the Waltham Mfg. Co. should have a brilliant future in the motor cycle field.

The Waltham Mfg. Co. have christened their quadricycle the "Autogo."



WALTHAM MFG. CO.'S "AUTOGO".

TROUBLE FOR MANUFACTURERS

The makers of motor-vehicles, in various parts of the country, are experiencing considerable trouble on account of the labor difficulties, which are at the worst in Chicago. At the old Siemens & Halske plant, where part of the cabs of the Electric Vehicle Co. are being constructed, work is at a practical standstill. The union machinists are all out and the vicinity of the works is being patrolled by union men, while women, armed with cameras, lie in wait for such non-union men as attempt to secure places, to photograph them for future identification and boycott, if moral suasion and threats will not keep them away.

At the factory of the Woods company things are in a similar plight.

C. W. King, who is building vehicles in the works of Geo. E. Lloyd & Co., is doing practically nothing owing to the strike.

At the Winton factory in Cleveland the machinists are also on a strike. In attempting to replace the union men with imported labor, the Winton company has been threatened with rioting and have obtained police protection.

The machinists' strike threatens to involve 100,000 men in various parts of the country.

SANDUSKY GASOLINE ENGINES

The Sandusky Automobile & Gas Engine Co., who are making preparations for entering the automobile business on a large scale, are at present prepared to furnish a limited number of 2½ horsepower gasoline engines, designed especially for automobile use and adapted to be placed in light runabouts. The company is also preparing to place complete vehicles on the market. At the present time they have a vehicle fitted with one of their engines running in Sandusky, where it is a decided novelty.

WHITNEY AND STANLEY JOIN FORCES

Boston, Mass., March 25.—It will surprise many who have thought themselves familiar with the motor industry to learn that George E. Whitney, one of the first steam carriage men in the East, has joined forces with the Stanley brothers of Newton, and that the trio are working together toward a common end. Mr. Whitney spends much of his time at Newton and, while it has been said that the Stanley carriage was not protected in part by patents, Mr. Whitney is authority for the statement that they are using some of his patented devices in the latest carriages.

NEW CORPORATIONS

The following companies have recently been incorporated:

The Schaum Automobile & Mfg. Co. of Baltimore, with an authorized capital stock of $50,000.

The U. S. Automobile Advertising Co. of New York City, with a capital stock of $4,000.

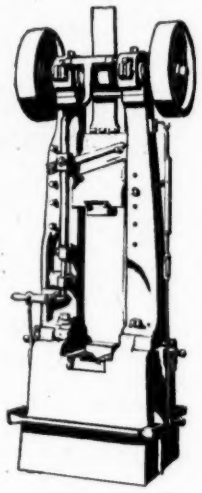
The Eckhard Motor Co. of Rochester, N. Y., with an authorized capital stock of $30,000, of which $16,480 has been paid in. Directors for the first year are John Eckhard, Clarence E. Butterfield and John McColl.

The Selma (Cal.) Automobile Co., to manufacture and trade in motor-vehicles. The directors are J. Brownstone, W. W. Stewart, A. B. Wasgatt, E. L. Shortridge and E. E. Shepard.

Walker & Ehrman of Chicago are making elaborate preparations for catering to automobile manufacturers. They have leased the large five story building at 127 and 129 West Washington Street, where they are installing a large amount of newly purchased machinery, in addition to that of their already large plant, in order to be in a position to supply parts of all descriptions.

The Snell Cycle Fittings Co. of Toledo are prepared to do all kinds of tool work, machine work and forge work for automobile manufacturers.

Drop Forgings



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preferably of the *gasoline* type.

Would consider nothing of an experimental nature or made by a concern unable to *guarantee prompt shipments.*

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